PATENT
Attorney Docket No. **DOW-04646**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	George P. Lomonosoff *et al.*		
Serial No.:	09/304,967	Group No.:	1636
Filed:	05/05/99	Examiner:	D. Guzo
Entitled:	**Modified Plant Viruses As Vectors of Heterologous Peptides**		

TRANSMITTAL OF FORMAL DRAWINGS

Official Draftsperson
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8(a)(1)(i)(A)

I hereby certify that this correspondence (along with any referred to as being attached or enclosed) is, on the date shown below, being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Dated: May 13, 2004 By: Traci L. Light
Traci E. Light

Sir or Madam:

In response to the NOTICE OF INFORMAL DRAWINGS or ALLOWABILITY, attached please find:

☒ **24** sheets of formal drawing(s) for this application.

☒ Each sheet of drawing indicates the identifying indicia suggested in 37 CFR § 1.84(c) on the front side of the drawing.

The Commissioner is hereby authorized to charge any additional fee or credit overpayment to our Deposit Account No. **08-1290. An originally executed duplicate of this transmittal is enclosed for this purpose.**

Dated: May 13, 2004

Peter G. Carroll
Registration No. 32,837

MEDLEN & CARROLL, LLP
101 Howard Street, Suite 305
San Francisco, California 94105
617/984.0616

Serial No.: 09/304,967 Filed: 05/05/99
Examiner: D. Guzo Group Art Unit: 1636
Applicant: George P. Lomonosoff
Title: **Modified Plant Viruses As Vectors of Heterologous Peptides**
Atty. Docket No.: DOW-04646 Sheet 1 of 24

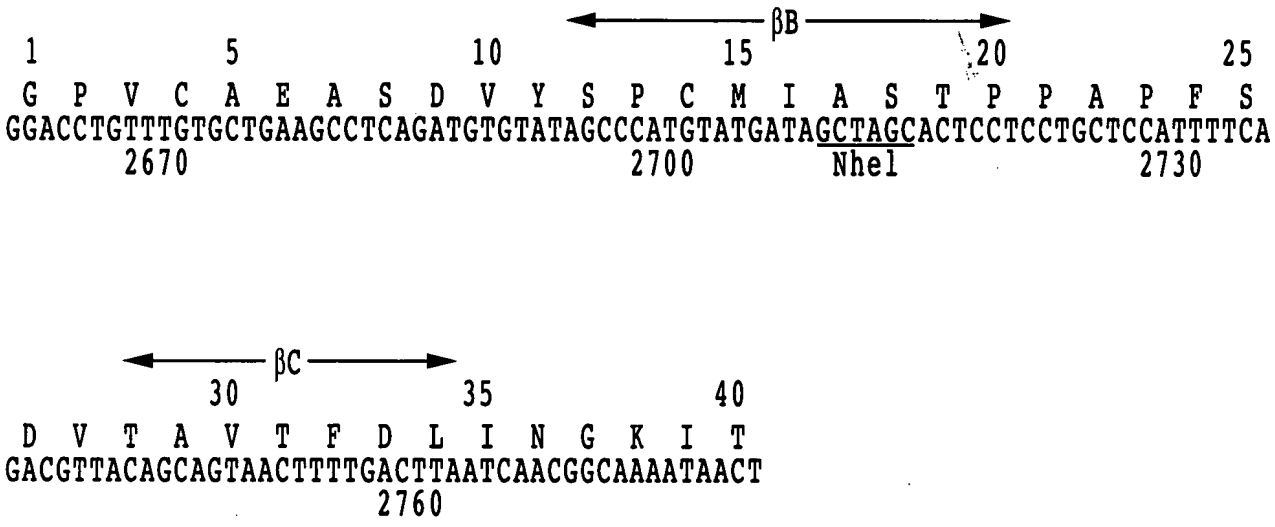


FIG. 1

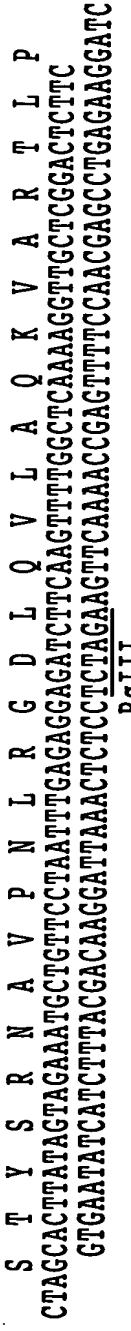
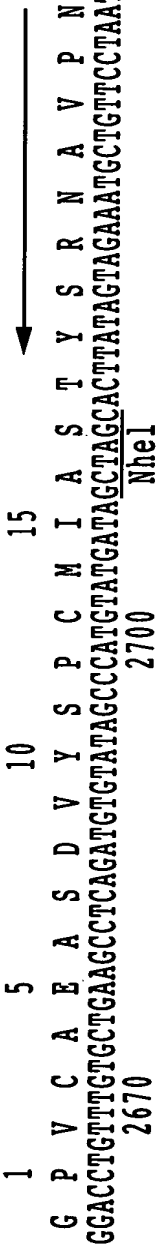


FIG. 2A



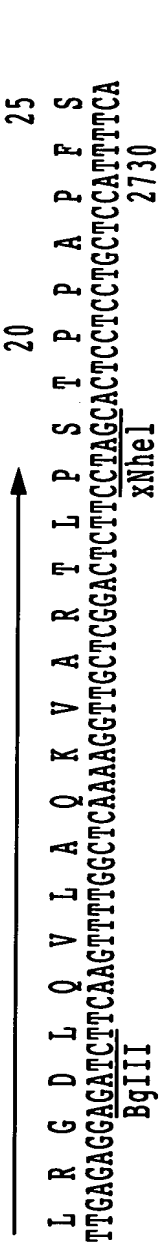


FIG. 2B

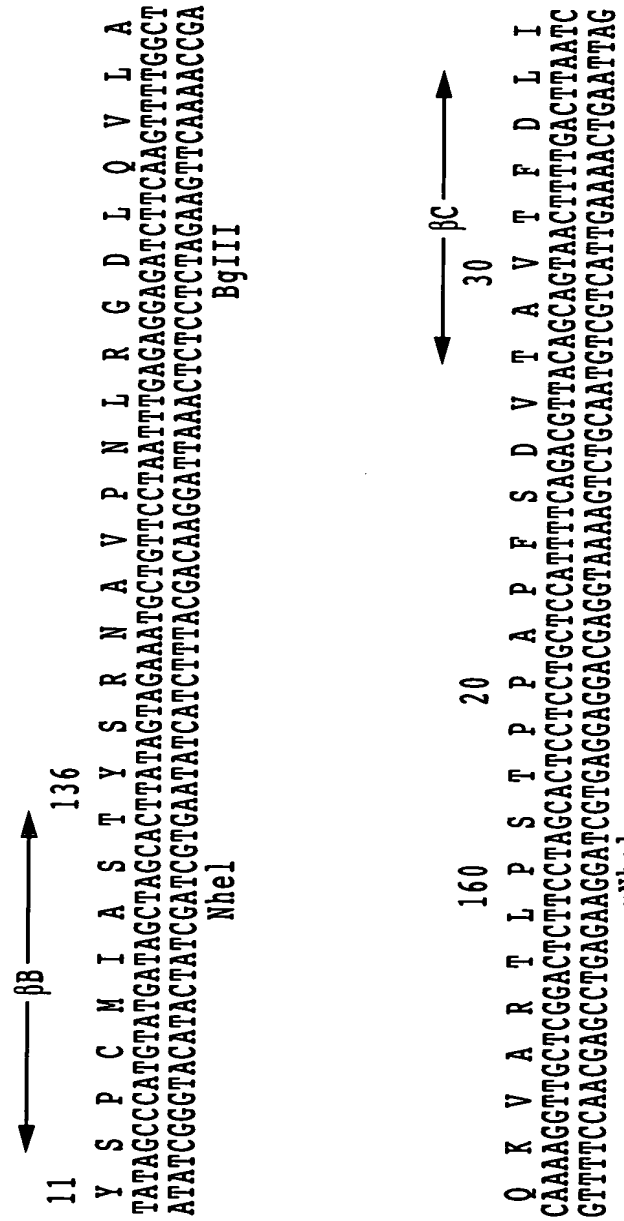


FIG. 3

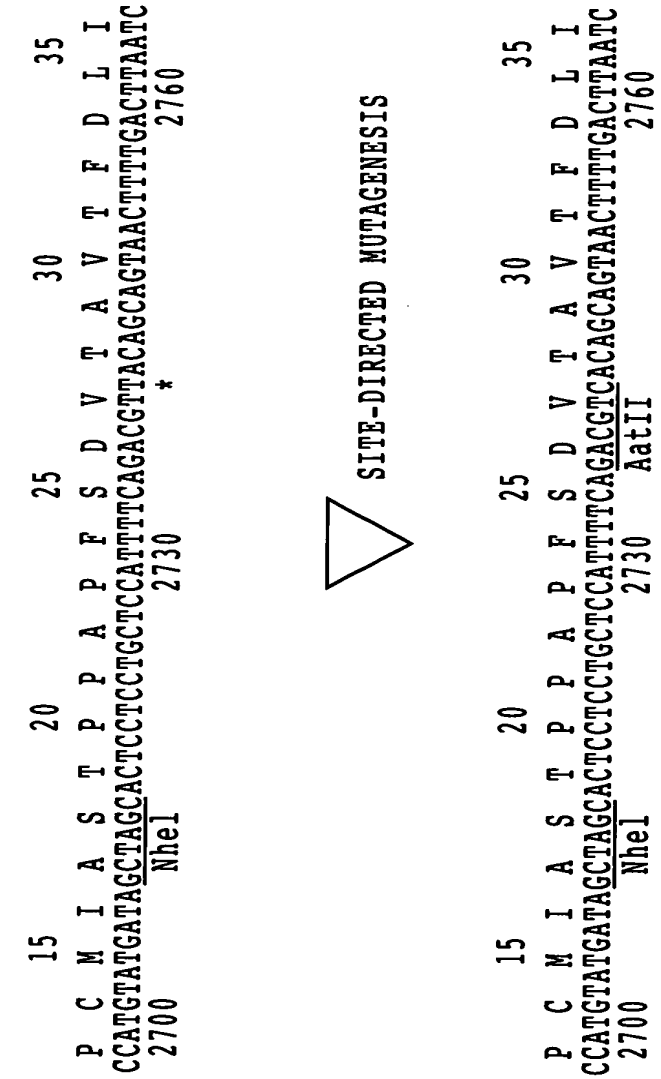
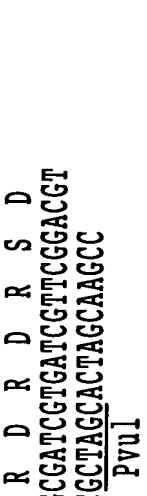


FIG. 4



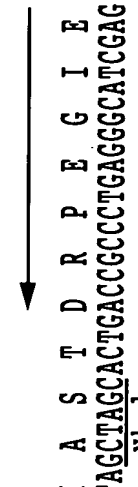


FIG. 5A

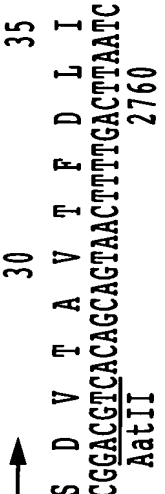


FIG. 5B

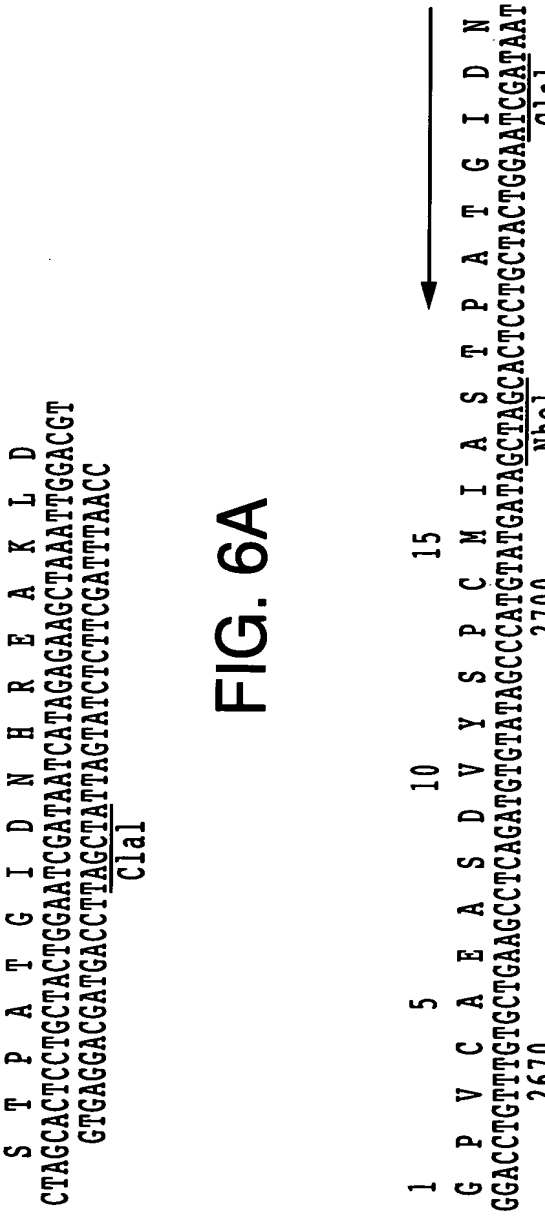


FIG. 6A

FIG. 6B

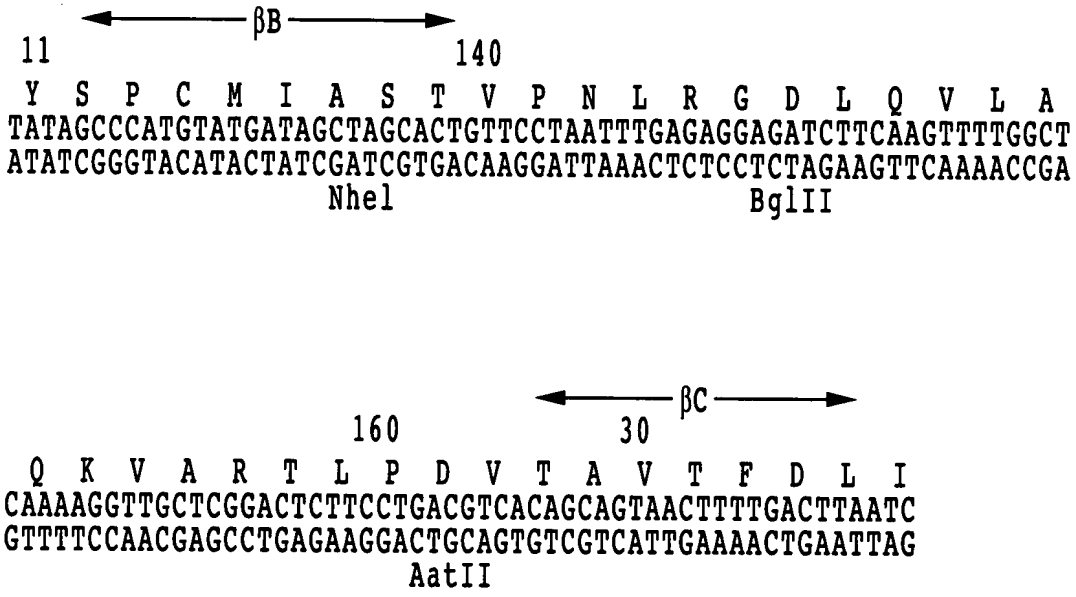


FIG. 7

No.: 09/304,967 Filed: 05/05/99
Examiner: D. Guzo Group Art Unit: 1636
Applicant: George P. Lomonosoff
Title: **Modified Plant Viruses As Vectors of Heterologous Peptides**
Atty. Docket No.: DOW-04646 Sheet 8 of 24

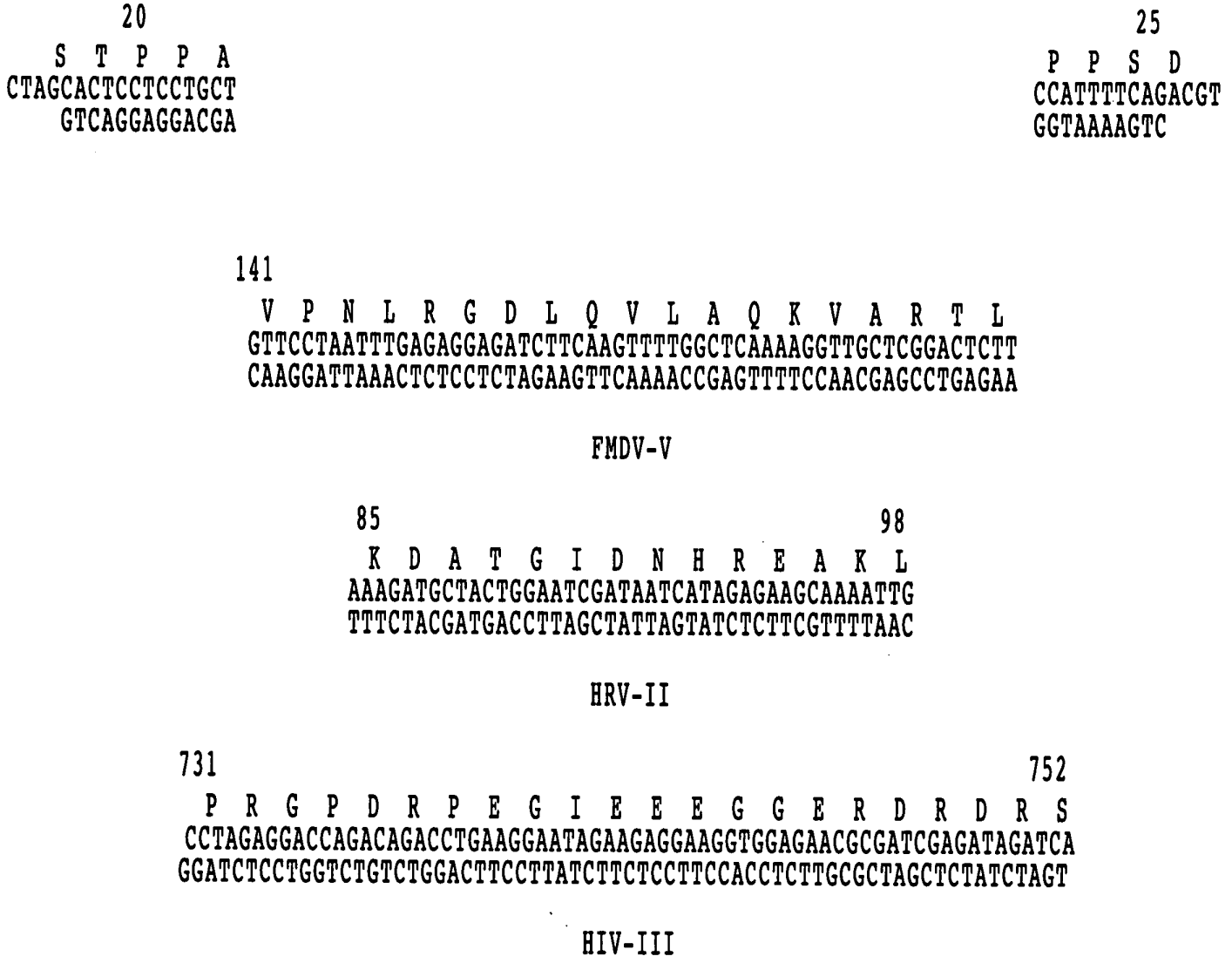


FIG. 8

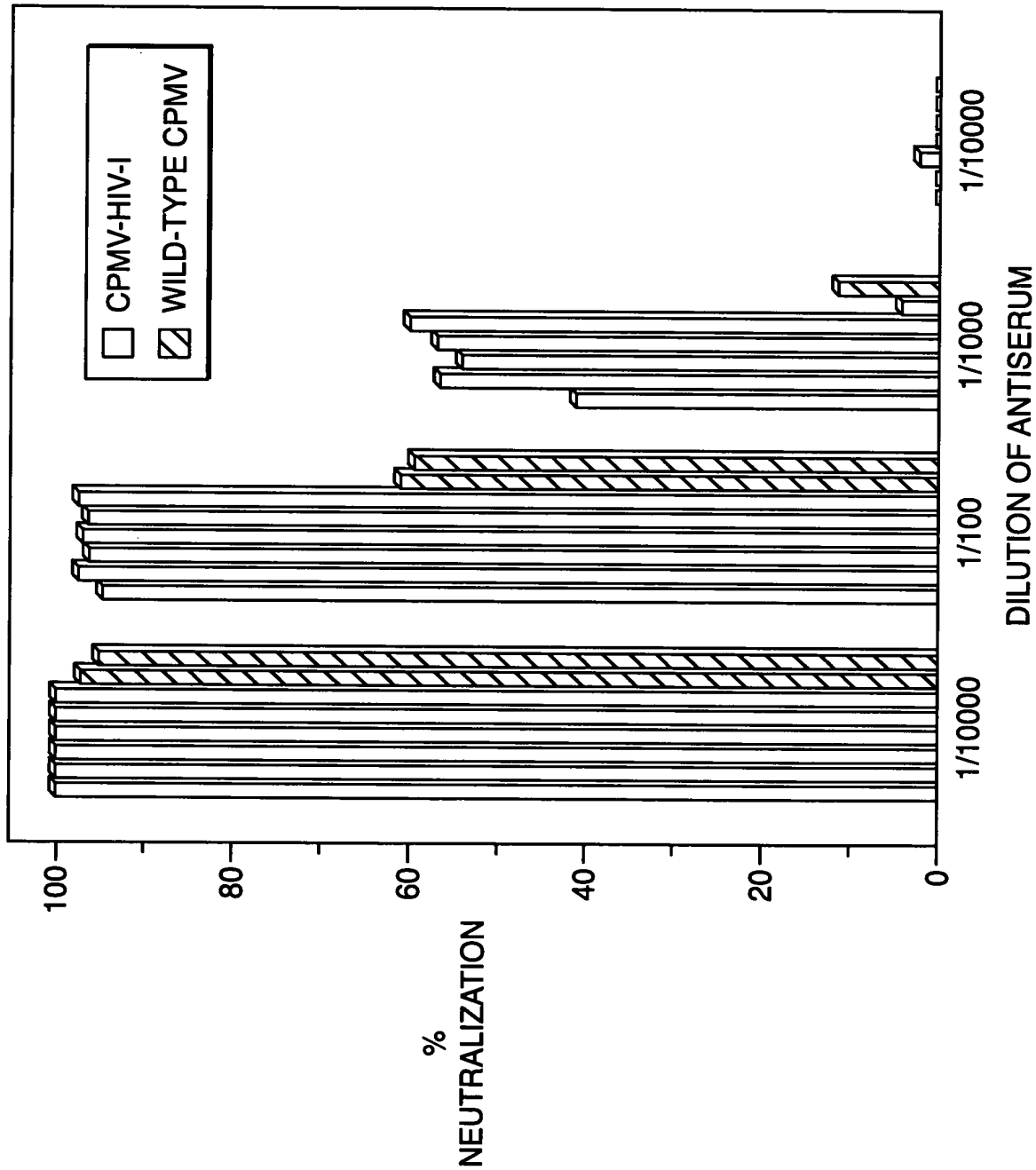


FIG. 9

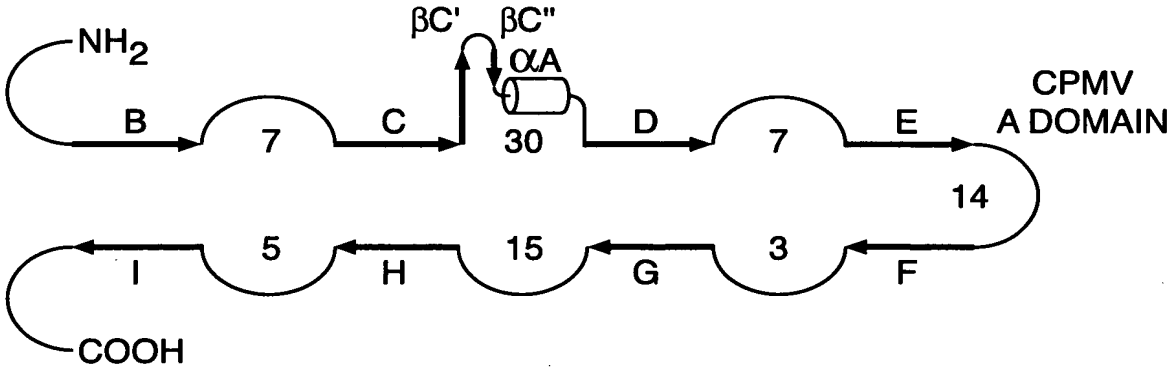


FIG. 10A

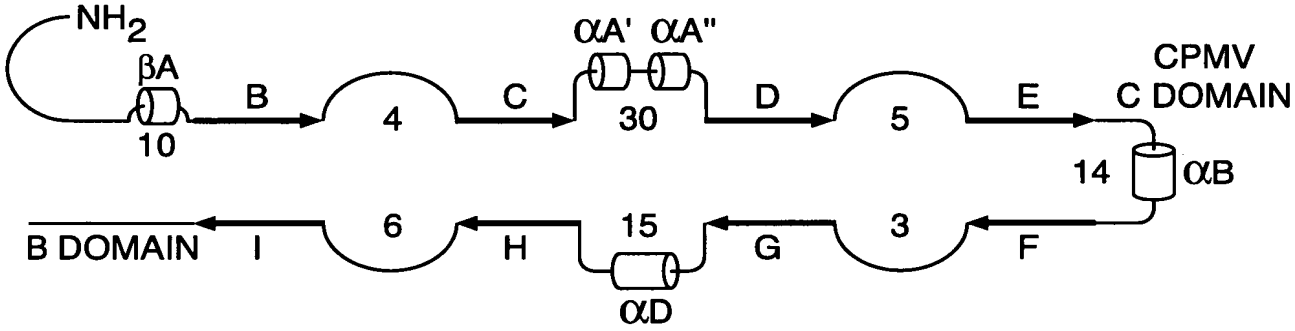


FIG. 10B

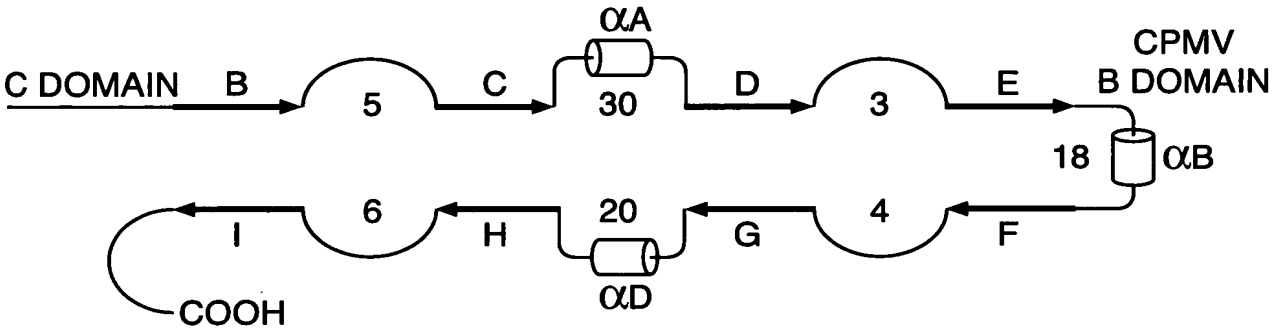


FIG. 10C

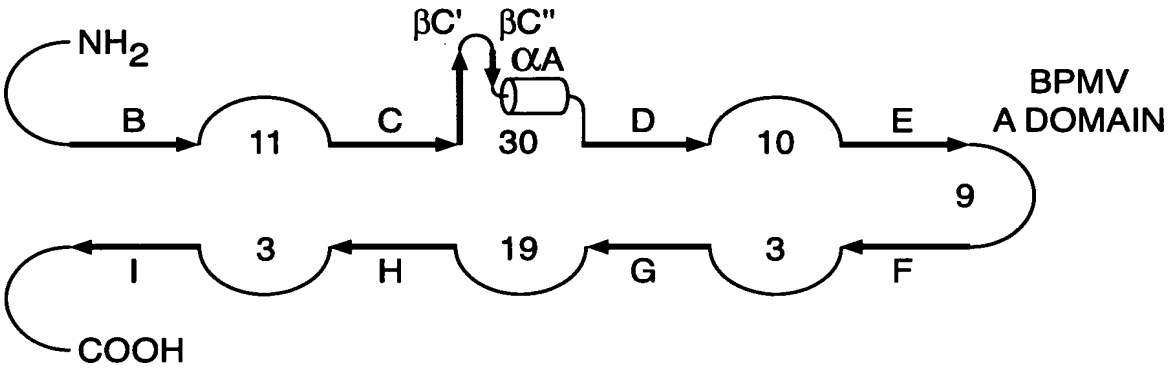


FIG. 10D

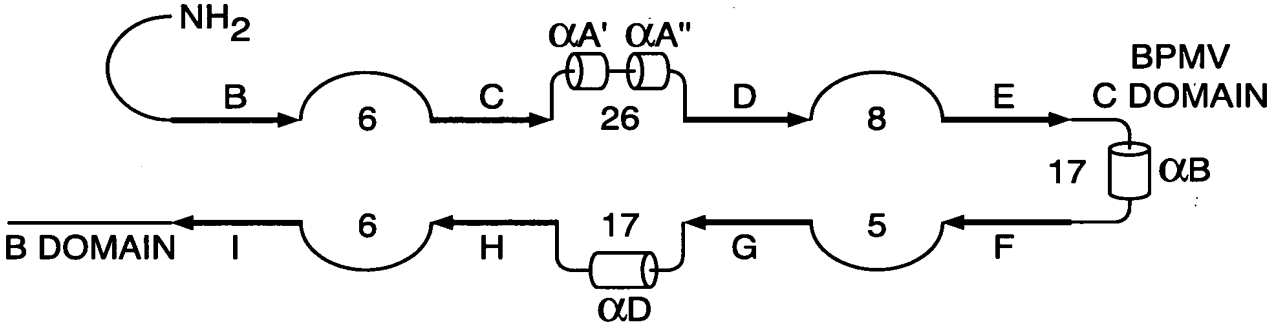


FIG. 10E

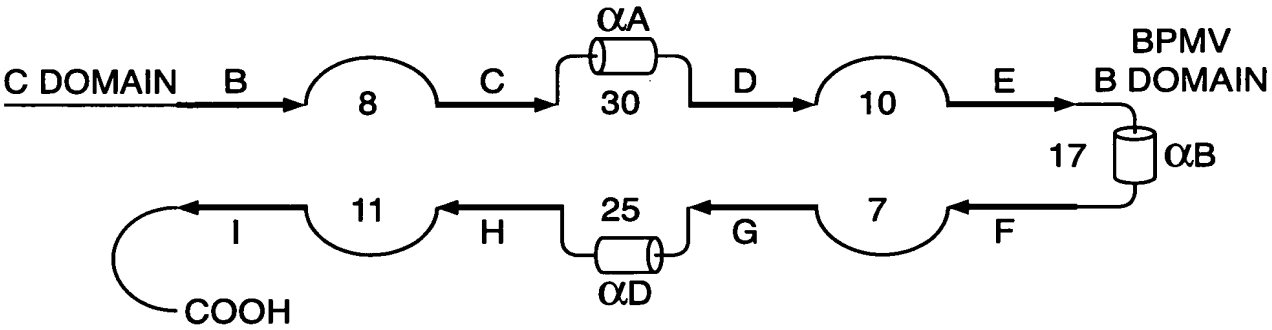


FIG. 10F

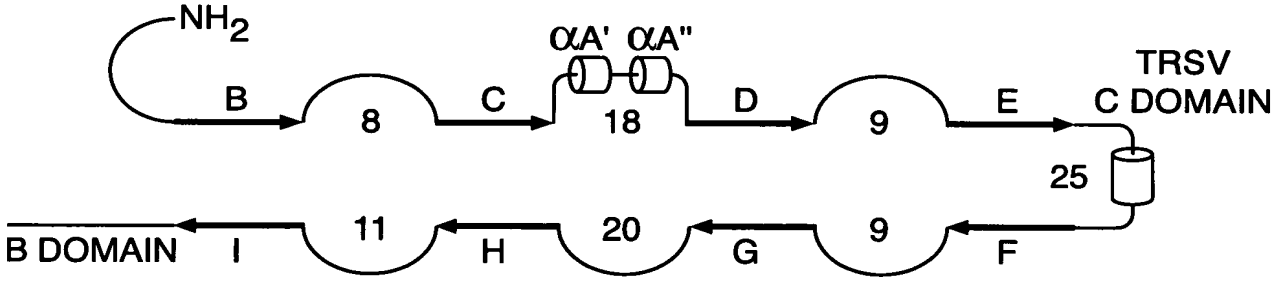


FIG. 10G

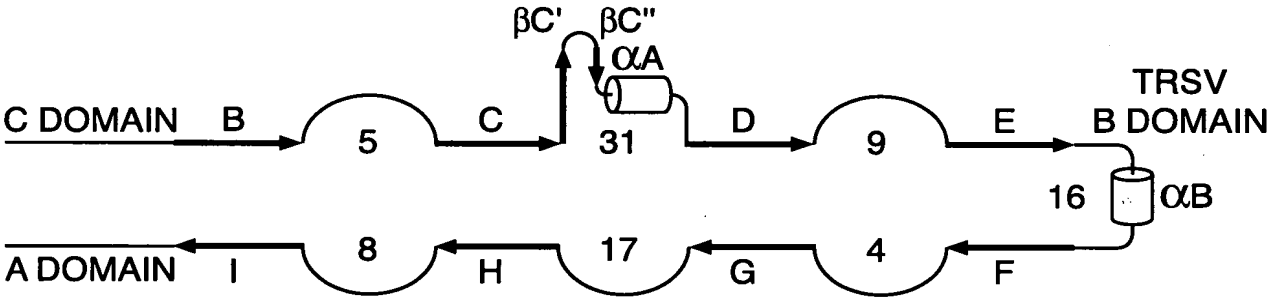


FIG. 10H

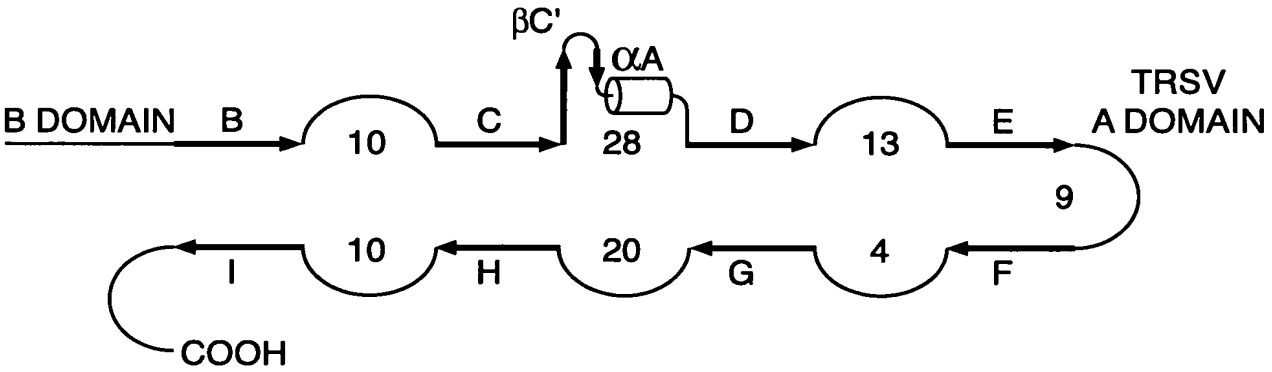


FIG. 10I

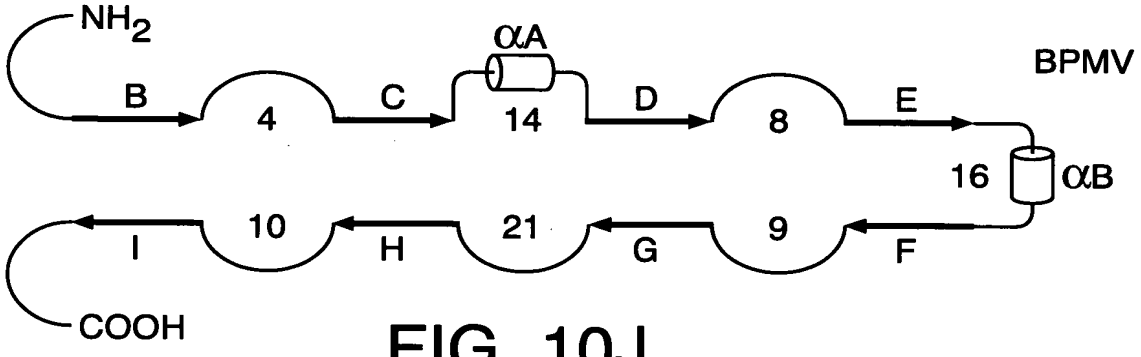


FIG. 10J

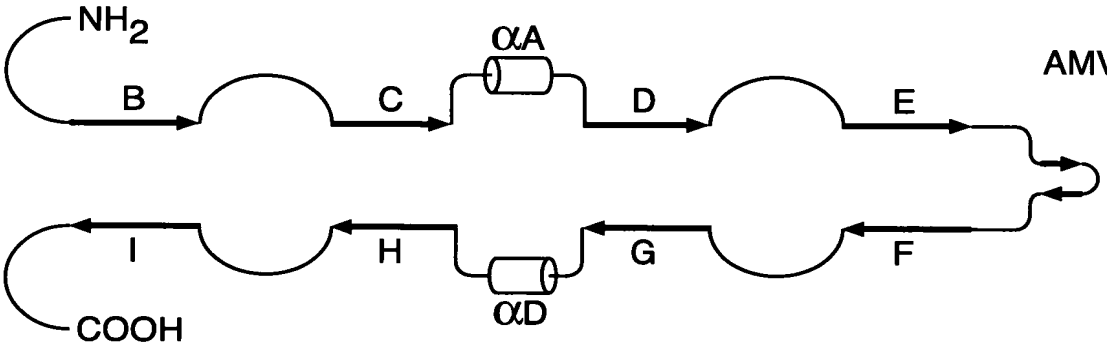


FIG. 10K

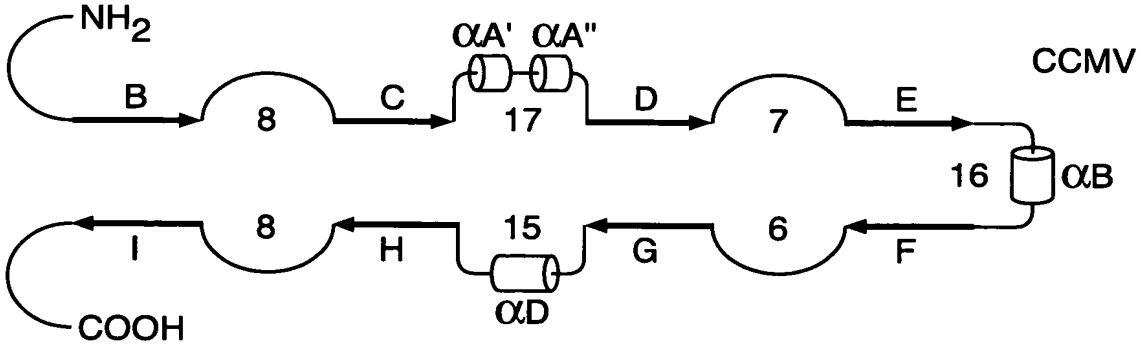


FIG. 10L

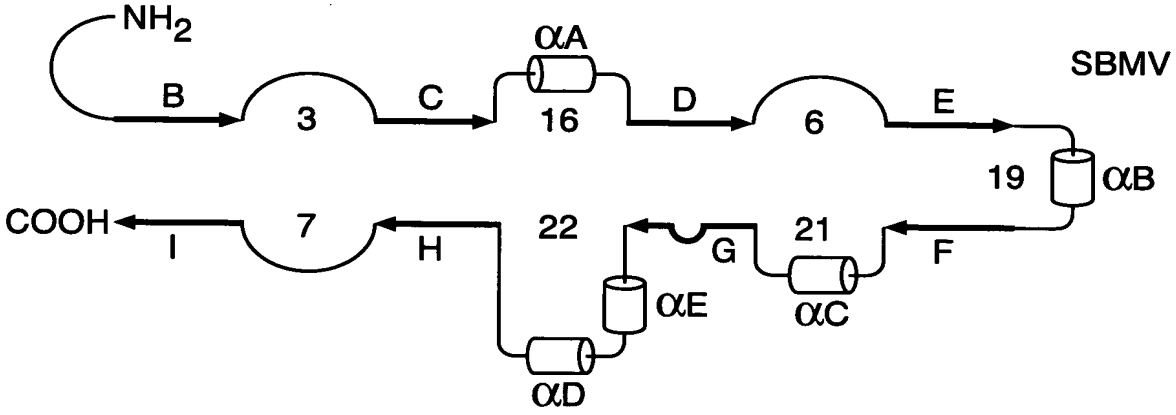


FIG. 10M

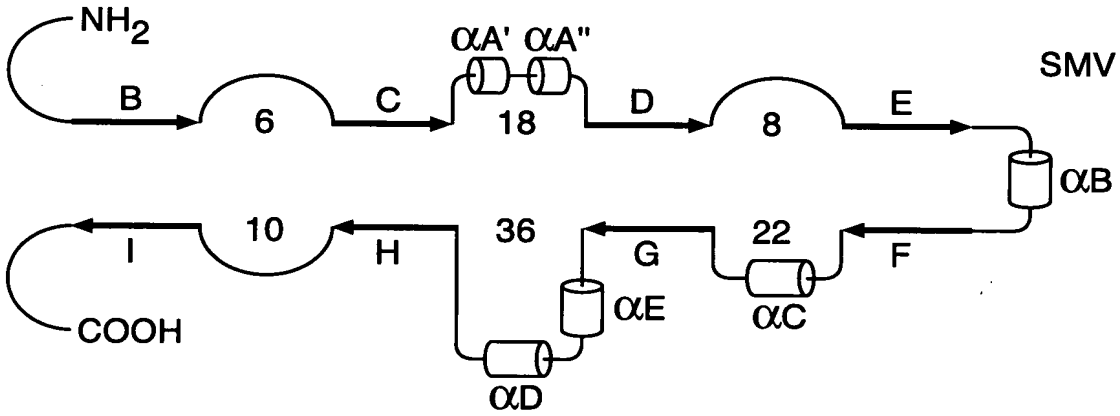


FIG. 10N

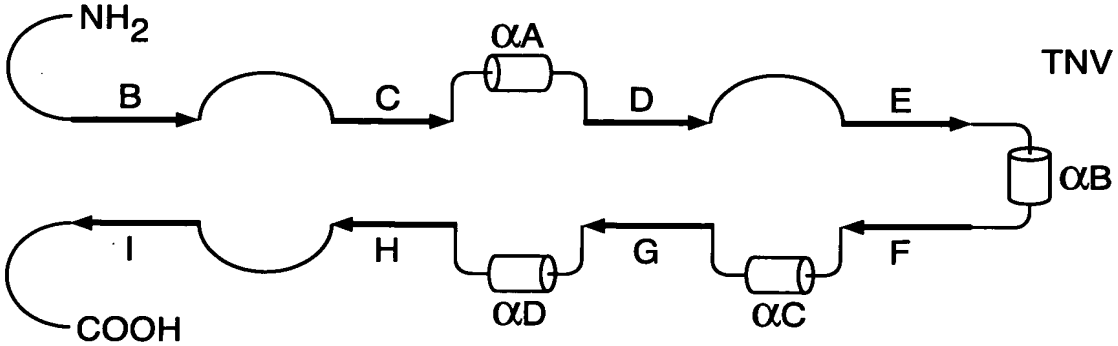


FIG. 10O

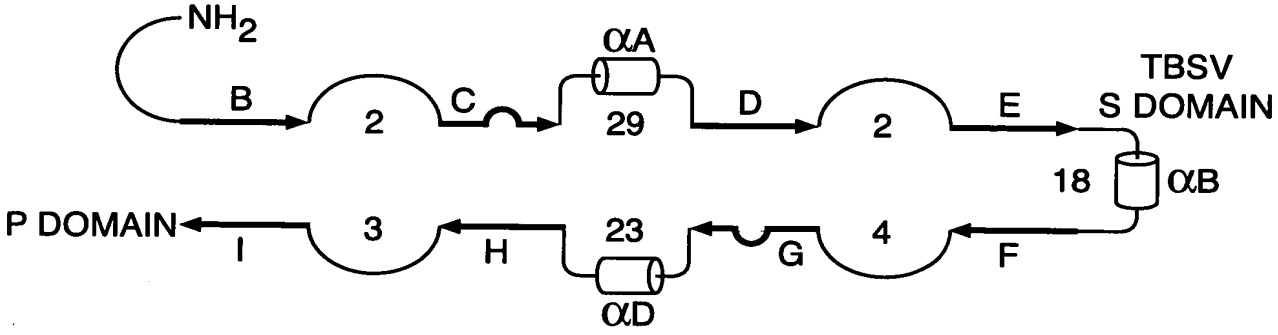


FIG. 10P

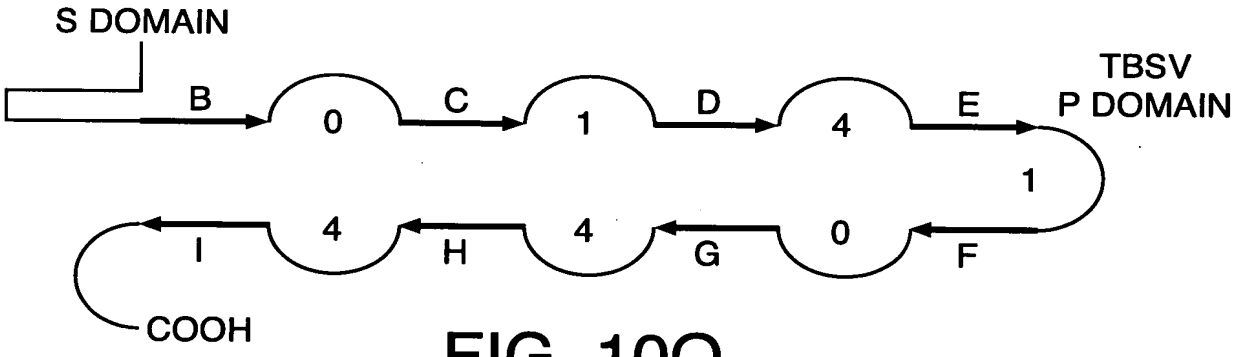


FIG. 10Q

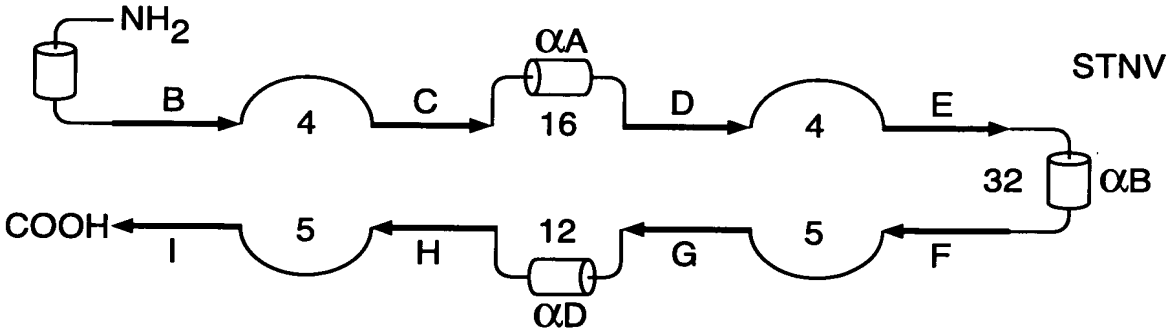


FIG. 10R

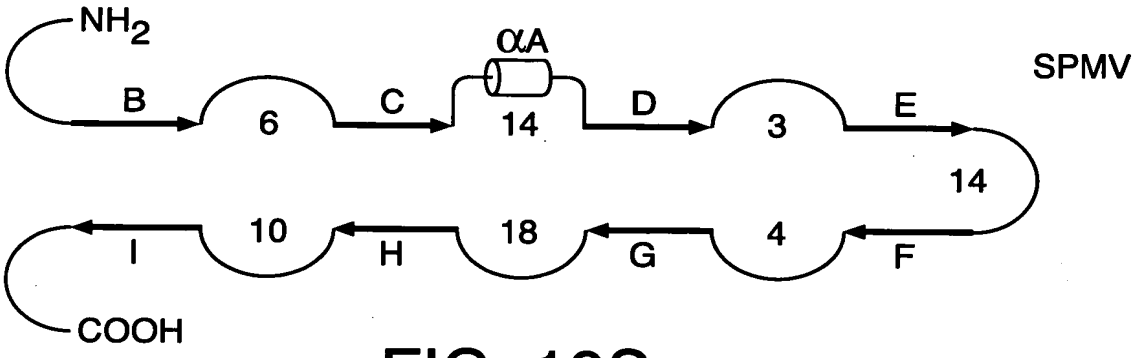


FIG. 10S

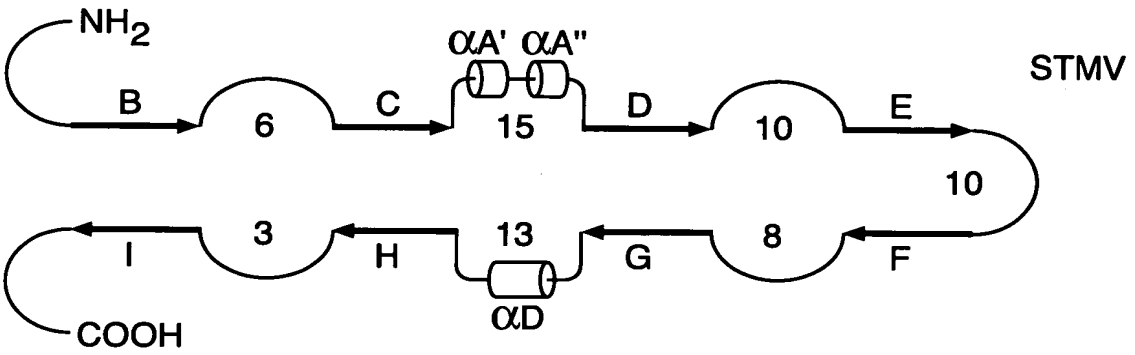


FIG. 10T

SEQUENCE OF SBMV COAT PROTEIN SPANNING THE POTENTIAL INSERTION SITE WITH INTRODUCED BASE CHANGES AND NEW RESTRICTION SITES:(SEQUENCE STARTS AT nt 3955)

```
M  E  G  G  S  S  K  T  A  V  N  T  G
ATGGAAGGAGGATCATCTAAGACTGCTGTGAACACTGGG
          ↓                    ↓
        GGATCC               GTTAAC
        BamH I               Hpa I
```

FIG. 11A

SERIES OF SEQUENCES TO BE INSERTED BETWEEN THE RESTRICTION SITES TO INSERT THE MUC1(16) EPITOPE AT VARIOUS LOCATIONS

```
G  V  T  S  A  P  D  T  R  P  A  P  G  S  T  A
GGTGTTACTTCTGCTCCTGATACTAGACCTGCTCCTGGTTCTACTGCT
CCACAATGAAGACGACCACTATGATCTGGACGAGGACCAAGATGACGA
```

GATCC	TCTAAGACTGCTGTT
G	AGATTCTGACGACAA
GATCCTCT	AAGACTGCTGTT
GAGA	TTCTGACGACAA
GATCCTCTAAG	ACTGCTGTT
GAGATTC	TGACGACAA
GATCCTCTAAGACT	GCTGTT
GAGATTCTGA	CGACAA
GATCCTCTAAGACTGCT	GTT
GAGATTCTGACGA	CAA

FIG. 11B

```
LTSV : NI---YAPARLTIAA-ANSSINIASVGTLYATYEVEL
SBMV : NIGNILVPARLVIAMEGGSSKTAVNTGRLYASYTIRL
SMV  : NIATDLVPARLVIALLDGSSSTAVAAGRIYASYTIQM
                ###########=############
                  βH    loop       βI
```

FIG. 12

No.: 09/304,967 Filed: 05/05/99
Examiner: D. Guzo Group Art Unit: 1636
Applicant: George P. Lomonosoff
Title: **Modified Plant Viruses As Vectors of Heterologous Peptides**
Atty. Docket No.: DOW-04646 Sheet 19 of 24

SEQUENCE OF LTSV COAT PROTEIN SPANNING THE POTENTIAL INSERTION SITE WITH INTRODUCED BASE CHANGES AND NEW RESTRICTION SITES:(SEQUENCE STARTS AT nt 3954)

```
I  A  A  A  N  S  S  I  N  I  A  S  V  G  T  L  Y
ATAGCCGCAGCTAACAGCTCCATAAACATAGCTAGTGTGGGTACTCTTTAT
        ↓                                    ↓
      CTGCAG                               GGTACC
      Pst I                                Kpn I
```

FIG. 13A

SERIES OF SEQUENCES TO BE INSERTED BETWEEN THE RESTRICTION SITES TO INSERT THE MUC1(16) EPITOPE AT VARIOUS LOCATIONS

```
G  V  T  S  A  P  D  T  R  P  A  P  G  S  T  A
GGTGTTACTTCTGCTCCTGATACTAGACCTGCTCCTGGTTCTACTGCT
CCACAATGAAGACGACCACTATGATCTGGACGAGGACCAAGATGACGA
```

GCTAACAGC ACGTCGATTGTCG	TCCATAAACATAGCTAGTGTGGGTAC AGGTATTTGTATCGATCACACC
GCTAACAGCTCC ACGTCGATTGTCGAGG	ATAAACATAGCTAGTGTGGGTAC TATTTGTATCGATCACACC
GCTAACAGCTCCATA ACGTCGATTGTCGAGGTAT	AACATAGCTAGTGTGGGTAC TTGTATCGATCACACC
GCTAACAGCTCCATAAAC ACGTCGATTGTCGAGGTATTTG	ATAGCTAGTGTGGGTAC TATCGATCACACC
GCTAACAGCTCCATAAACATA ACGTCGATTGTCGAGGTATTTGTAT	GCTAGTGTGGGTAC CGATCACACC
GCTAACAGCTCCATAAACATAGCT ACGTCGATTGTCGAGGTATTTGTATCGA	AGTGTGGGTAC TCACACC

FIG. 13B

LIPMAN-PEARSON PROTEIN ALIGNMENT
KTUPLE: 2; GAP PENALTY: 4; GAP LENGTH PENALTY: 12

SEQ1(1>389)	SEQ2(1>340)	SIMILARITY	GAP	GAP	CONSENSUS
tbsvtbs.PRO	rcnmvdia.PRO	INDEX	NUMBER	LENGTH	LENGTH
(64>387)	(8>338)	26.9	4	7	331

```
          70        80        90       100       110       120
KKQQMINHVGGTGGAIMAPVAVTRQLVGSKPKFTGRTSGSVTVTHREYLSQVNNSTGFQV
K.:Q. :. . T .: : .VA:. . .   . . ... : .: H : :  V .S. .:.
KSKQRSQPRNRTPNTSVKTVAIPFAKTQIIKTVNPPPKPARGILHTQLVMSVVGSVQMRT
  10        20        30        40        50        60

         130       140       150       160       170       180
NGGIVGNLLQLNPLNGTLFSWLPAIASNFDQYTFNSVVLHYVPLCSTTEVGRVAIYFDKD
N.G  .: ::LNP N :LF: L:  A:N:D Y ::.:.L:YVPL :. : GRVA: .D D
NNGKSNQRFRLNPSNPALFPTLAYEAANYDMYRLKKLTLRYVPLVTVQNSGRVAMIWDPD
  70        80        90       100       110       120

         190       200       210       220       230       240
SEDPEPADRVELANYSVLKETAPWAEAMLRVPTDKIKRFCDDSSTSDHKLIDLGQLGIAT
S:D:.P..R E::.YS   .TA ...  L :P:D:  RF .D::T D:KL:D:GQL :.T
SQDSAPQSRQEISAYSRSVSTAVYEKCSLTIPADNQWRFVADNTTVDRKLVDFGQLLFVT
 130       140       150       160       170       180

         250       260       270       280       290           300
YGGAGTNAVGDIFISYSVTLYFPQPTNTLLSTRRLDLAGALVTASGPGYLLVSR---TAT
.:G::. ..GDIF:...V.:  PQPT.::: .  :DL:G:L.: .GP:YL: :    T::
HSGSDGIETGDIFLDCEVEFKGPQPTASIVQKTVIDLGGTLTSFEGPSYLMPPDAFITSS
 190       200       210       220       230       240

          310       320       330       340       350
VLTMTFRATGTFVISGTYRCLTATTLGLAG--GVNVNSITVVDNIG-TDSAFFINCTVSN
 :.:   .:GT:::: .  C T:.::.::G  .:  :: :. :: . ..S  F.:..V :
SFGLFVDVAGTYLLTLVVTCSTTGSVTVGGNSTLVGDGRAAYGSSNYIASIVFTSSGVLS
 250       260       270       280       290       300

 360       370       380
LPSVVTFT-STGITSATVHCVRATRQNDVSL
 .: V F: S:G::.. ::  R .: N.  L
TTPSVQFSGSSGVSRVQMNICRCKQGNTFIL
 310       320       330
```

FIG. 14

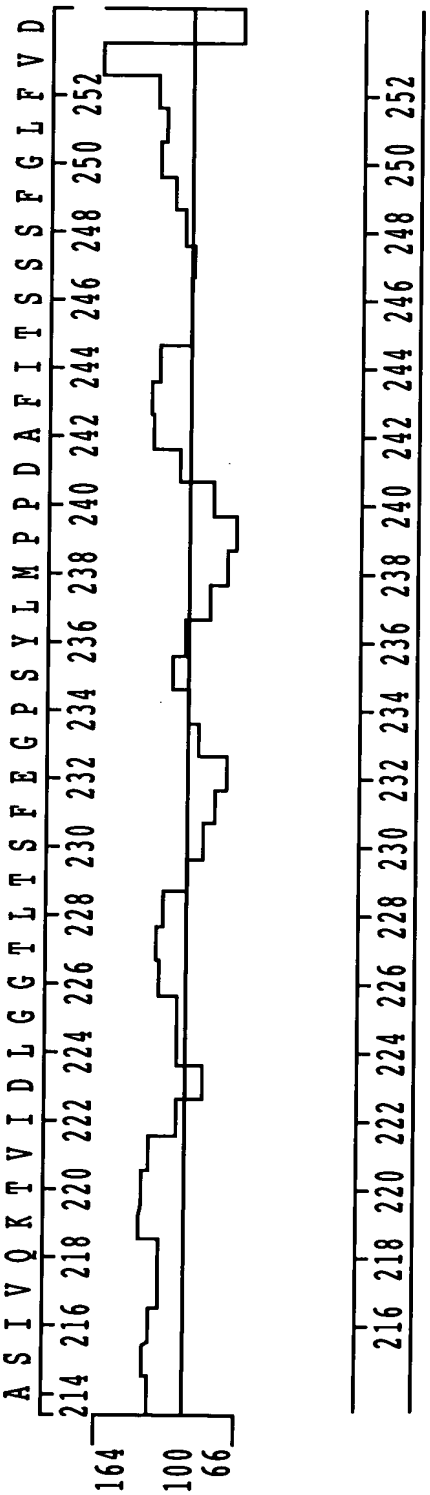


FIG. 15

```
                          220       230       240
          AA       |ASIVQKYVIDLGGTLTSFEGPSYLMPP
          PHD sec  | HHHHHEEEE   EEEE    EEEEE
          Rel sec  |145432244525515625586487624
detail :
          prH sec  |46665532111110000000000000
          prE sec  |10112345663224675221268875 3
          prL sec  |42222111224664223778731124 6
subset :  SUB sec  |..H......E.LL.EE.LLLL.EEE..
```

```
ABBREVIATIONS:
      AA: AMINO ACID SEQUENCE
      H: HELIX
      E: EXTENDED (SHEET)
      BLANK: OTHER (LOOP)
      PHD: PROFILE NETWORK PREDICTION HEIDELBERG
      Rel: RELIABILITY INDEX OF PREDICTION (0-9)
      prH: PROBABILITY FOR ASSIGNING HELIX
      prE: PROBABILITY FOR ASSIGNING STRAND
      prL: PROBABILITY FOR ASSIGNING LOOP
      SUB: A SUBSET OF THE PREDICTION, FOR ALL RESIDUES
           WITH AN AVERAGE EXPECTED ACCURACY OF >82%
```

FIG. 16

SEQUENCE OF RCNMV COAT PROTEIN SPANNING THE POTENTIAL INSERTION SITE WITH INTRODUCED BASE CHANGES AND NEW RESTRICTION SITES:(SEQUENCE STARTS AT nt 3070)

```
S  I  V  Q  K  T  V  I  D  L  G  G  T  L  T  S  F
AGCATCGTACAGAAAACTGTAATTGATCTCGGTGGGACACTCACTTCTTTC
       ↓  ↓                          ↓  ↓
      GTGCAC                        GTTAAC
      ApaI I                        HpaI
```

FIG. 17A

SERIES OF SEQUENCES TO BE INSERTED BETWEEN THE RESTRICTION SITES TO INSERT THE MUC1(16) EPITOPE AT VARIOUS LOCATIONS

```
G  V  T  S  A  P  D  T  R  P  A  P  G  S  T  A
GGTGTTACTTCTGCTCCTGATACTAGACCTGCTCCTGGTTCTACTGCT
CCACAATGAAGACGACCACTATGATCTGGACGAGGACCAAGATGACGA
```

GAAAACTGTA	ATTGATCTCGGTGGGACGTT
ACGTCTTTTGACAT	TAACTAGAGCCACCCTGCAA
GAAAACTGTAATT	GATCTCGGTGGGACGTT
ACGTCTTTTGACATTAA	CTAGAGCCACCCTGCAA
GAAAACTGTAATTGAT	CTCGGTGGGACGTT
ACGTCTTTTGACATTAACTA	GAGCCACCCTGCAA
GAAAACTGTAATTGATCTC	GGTGGGACGTT
ACGTCTTTTGACATTAACTAGAG	CCACCCTGCAA
GAAAACTGTAATTGATCTCGGT	GGGACGTT
ACGTCTTTTGACATTAACTAGAGCCA	CCCTGCAA
GAAAACTGTAATTGATCTCGGTGGG	ACGTT
ACGTCTTTTGACATTAACTAGAGCCACCC	TGCAA

FIG. 17B

NUCLEOTIDE AND AMINO-ACID SEQUENCE OF THE C-TERMINAL REGION OF THE COAT PROTEIN OF TRV:

```
      S  T  P  A  S  G  G  S  G  A  T  P  P  P  A  S  G  G  A  V  R  P  N  P  *
1125  CGTCGACTCCGGCCTCGGGGGGAAGTGGTGCAACACCACCTCCTGCGAGTGGGGGTGCTGTGCGTCCTAATCCTTGATGTCGTCAAATCAAACCTTTAAGGGACCTT  1230
      ↑                                                                                                   ↑
     Sal I                                                                                              PpuM I
```

FIG. 18A

SERIES OF SEQUENCES TO BE INSERTED BETWEEN THE Sal I AND PpuM I RESTRICTION SITES TO CREATE C-TERMINAL DELETIONS:

```
 S  T  P  A  S  G  G  S  G  A  T  P  P  P  A  S  G  G  A  *
TCGACTCCGGCCTCGGGGGGAAGTGGTGCAACACCACCTCCTGCGAGTGGGGGTGCTTGATGTCGTCAAATCAAACCTTTAAGG
    GAGGCCGGAGCCCCCCTTCACCACGTTGTGGTGGAGGACGCTCACCCCCACGAACTACAGCAGTTTAGTTTGGAAATTCCCTG

 S  T  P  A  S  G  G  S  G  A  T  P  P  P  *
TCGACTCCGGCCTCGGGGGGAAGTGGTGCAACACCACCTCCTTGATGTCGTCAAATCAAACCTTTAAGG
    GAGGCCGGAGCCCCCCTTCACCACGTTGTGGTGGAGGAACTACAGCAGTTTAGTTTGGAAATTCCCTG

 S  T  P  A  S  G  G  S  G  *
TCGACTCCGGCCTCGGGGGGAAGTGGTTGATGTCGTCAAATCAAACCTTTAAGG
    GAGGCCGGAGCCCCCCTTCACCAACTACAGCAGTTTAGTTTGGAAATTCCCTG

 S  T  P  A  *
TCGACTCCGGCCTGATGTCGTCAAATCAAACCTTTAAGG
    GAGGCCGGACTACAGCAGTTTAGTTTGGAAATTCCCTG

 S  T  *
TCGACTTGATGTCGTCAAATCAAACCTTTAAGG
    GAACTACAGCAGTTTAGTTTGGAAATTCCCTG
```

FIG. 18B

No.: 09/304,967 Filed: 05/05/99
Examiner: D. Guzo Group Art Unit: 1636
Applicant: George P. Lomonosoff
Title: Modified Plant Viruses As Vectors of Heterologous Peptides
Atty. Docket No.: DOW-04646 Sheet 24 of 24